IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRIUMPH IP LLC, Plaintiff, v. **UTSTARCOM, INC.,** Defendant.	C.A. NO. _____ **JURY TRIAL DEMANDED** **PATENT CASE**

ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Triumph IP LLC files this Original Complaint for Patent Infringement against UTStarcom, Inc., and would respectfully show the Court as follows:

I. THE PARTIES

1. Plaintiff Triumph IP LLC ("Triumph" or "Plaintiff") is a Texas limited liability company having an address at 1401 Lavaca Street, Suite 922, Austin, TX 78701.

2. On information and belief, Defendant UTStarcom, Inc. ("Defendant") is a corporation organized and existing under the laws of Delaware, with a registered agent at The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801.

II. JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction of such action under 28 U.S.C. §§ 1331 and 1338(a).

4. On information and belief, Defendant is subject to this Court's specific and general personal jurisdiction, pursuant to due process and the Delaware Long-Arm Statute, due at least to its business in this forum, including at least a portion of the infringements alleged herein.

Furthermore, Defendant is subject to this Court's specific and general personal jurisdiction because Defendant is a Delaware corporation.

5. Without limitation, on information and belief, Defendant has derived revenues from its infringing acts occurring within Delaware. Further, on information and belief, Defendant is subject to the Court's general jurisdiction, including from regularly doing or soliciting business, engaging in other persistent courses of conduct, and deriving substantial revenue from goods and services provided to persons or entities in Delaware. Further, on information and belief, Defendant is subject to the Court's personal jurisdiction at least due to its sale of products and/or services within Delaware. Defendant has committed such purposeful acts and/or transactions in Delaware such that it reasonably should know and expect that it could be haled into this Court as a consequence of such activity.

6. Venue is proper in this district under 28 U.S.C. § 1400(b). On information and belief, Defendant is incorporated in Delaware. Under the patent venue analysis, Defendant resides only in this District. On information and belief, from and within this District Defendant has committed at least a portion of the infringements at issue in this case.

7. For these reasons, personal jurisdiction exists and venue is proper in this Court under 28 U.S.C. § 1400(b).

III. COUNT I
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 7,177,291)

8. Plaintiff incorporates the above paragraphs herein by reference.

9. On February 13, 2007, United States Patent No. 7,177,291 ("the '291 Patent") was duly and legally issued by the United States Patent and Trademark Office. The '291 Patent is titled "Method for Associating an Apparatus in a Communication Network." The term of the '291 patent

has been adjusted by 1,126 days. A true and correct copy of the '291 Patent is attached hereto as Exhibit A and incorporated herein by reference.

10. Triumph is the assignee of all right, title, and interest in the '291 patent, including all rights to enforce and prosecute actions for infringement and to collect damages for all relevant times against infringers of the '291 Patent. Accordingly, Triumph possesses the exclusive right and standing to prosecute the present action for infringement of the '291 Patent by Defendant.

11. The invention in the '291 Patent relates to the field of associating an apparatus to a communication network capable of sharing the same transmission frequency resources as another neighboring network. (Ex. A at col. 1:9-12). The inventor's recognized inefficiencies of the prior art when the collision of the frames originating from two networks contacting the same apparatus and developed an improved method. (*Id*. at col. 1:38-40).

12. Local networks using sharing of the radio resource in Frequency Division Multiple Access ("FDMA") mode are required to use one channel from among a finite set of channels, which is given and granted by the standardizing bodies. (*Id.* at col. 1:19-22). To avoid mutual disturbance, it is oven advisable to implement techniques for probing various channels. (*Id.* at col. 1:23-24). Equipment wishing to create a wireless network will listen to channels and choose a channel which it deems to be free of any radio activity, using a dynamic frequency selection ("DFS") mechanism. (*Id.* at col. 1:26-30). However, when there are multiple local networks, it is possible that two networks, though geographically close, may have chosen the same frequency, without interfering with one another. (*Id*. at col. 1:31-34). This is all the more probable the lower the number of channels dedicated to this service. (*Id.* at col. 1:34-35). It may be the case where an apparatus which has to associate itself with a network may also be able to communicate with a

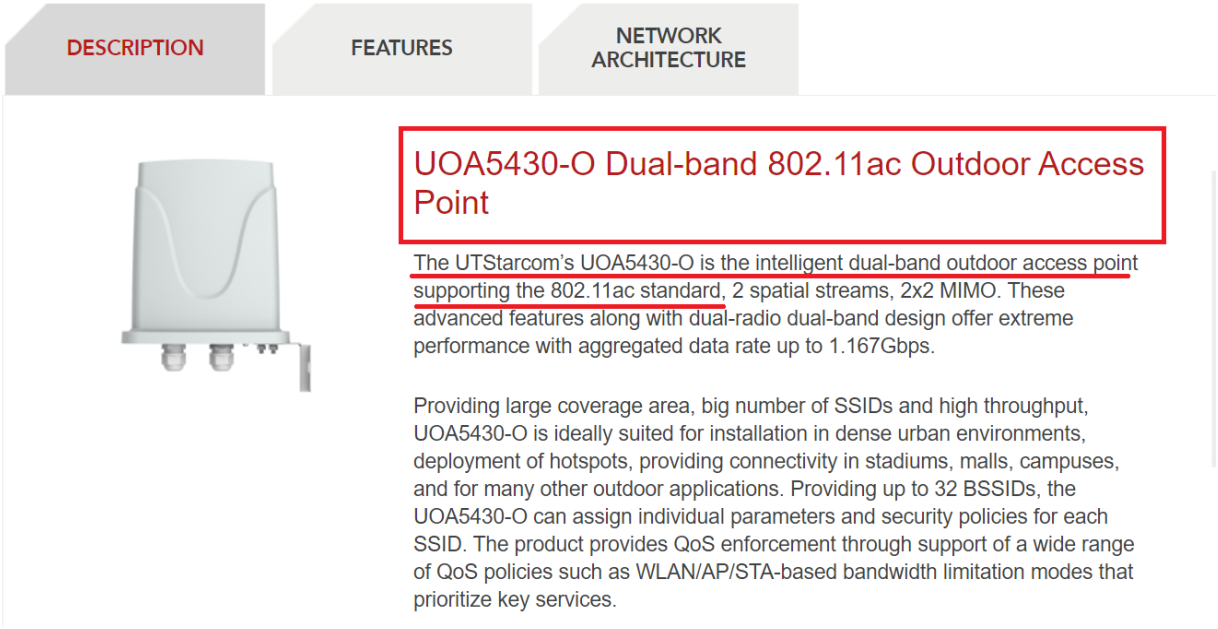
base station of another network, causing the problem of the collision of frames originating from the two networks at the level of the apparatus. (*Id.* at col. 1:36-40).

13. The inventors recognized that they could reduce the collision of frames in a communications network when associating an apparatus to a first communication network by performing the steps of detecting by the apparatus a first transmission channel, determining a collision on the channel between signals originating from the first network and from a second network; in case of collision, transmitting a change of channel request to the first network, and associating the apparatus with a base station of the first network following non-detection of a collision. (*Id.* at col. 4:41-53).

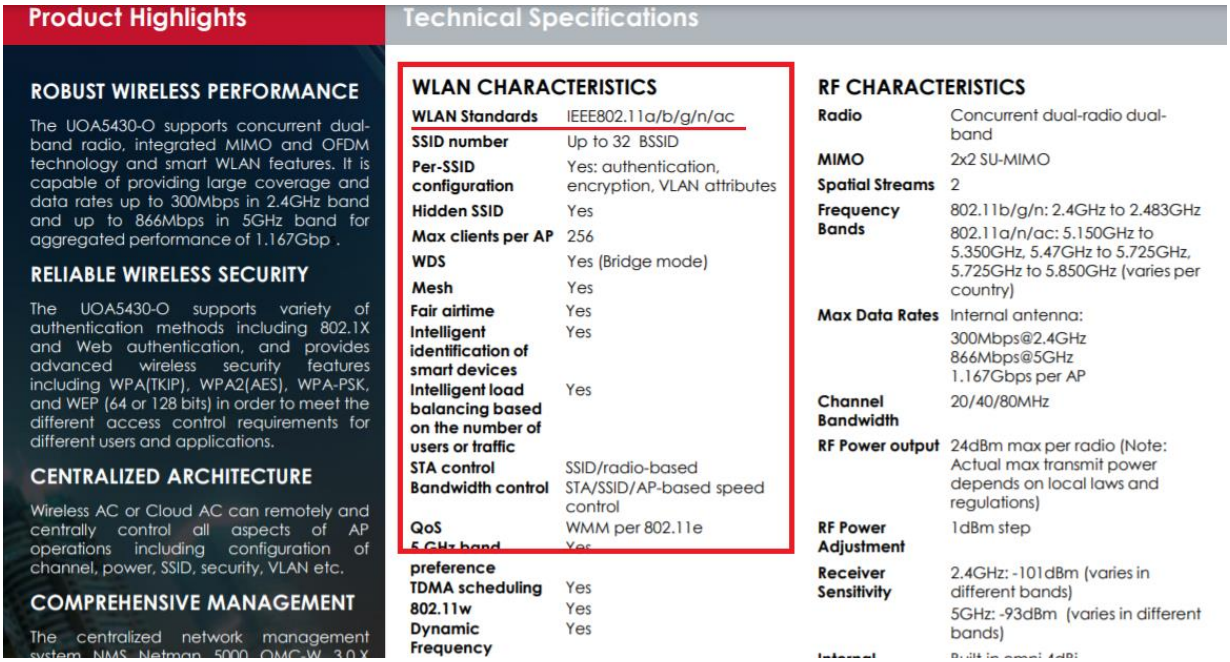
14. **Direct Infringement.** Upon information and belief, Defendant has been directly infringing at least claim 1 of the '291 patent in Delaware, and elsewhere in the United States, by performing actions comprising at least performing the claimed process for associating an apparatus to a first communication network with transmissions in the first network being performed on a first channel using the UTStarcom UOA5430-O Dual-band 802.11ac Outdoor Access Point ("Accused Instrumentality") (*e.g.*, https://www.utstar.com/?q=uoa5430-o).

15. The Accused Instrumentality practices a process for associating an apparatus (*e.g.*, associating client devices such as a smartphone, etc.) to a first communication network (*e.g.*, Wi-Fi network of the Accused Instrumentality), with transmissions in the first network (*e.g.*, Wi-Fi network of the Accused Instrumentality), being performed on a first channel (*e.g.*, a communication channel). The Accused Instrumentality supports IEEE 802.11n/ac standard and acts as a Wi-Fi access point. It connects an associating client device such as a smartphone, etc. over a first communication channel (e.g., primary channel or primary channel along with secondary channel for high throughput) on Wi-Fi network according to the standard. (*E.g.*,

http://www.utstar.com/; https://www.utstar.com/?q=uoa5430-o; https://www.utstar.com/sites/default/files/resources/uoa5430-o_data_sheet.pdf; https://standards.ieee.org/standard/802_11n-2009.html; https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).



(*E.g.*, https://www.utstar.com/?q=uoa5430-o).



Product Highlights

ROBUST WIRELESS PERFORMANCE

The UOA5430-O supports concurrent dual-band radio, integrated MIMO and OFDM technology and smart WLAN features. It is capable of providing large coverage and data rates up to 300Mbps in 2.4GHz band and up to 866Mbps in 5GHz band for aggregated performance of 1.167Gbp .

RELIABLE WIRELESS SECURITY

The UOA5430-O supports variety of authentication methods including 802.1X and Web authentication, and provides advanced wireless security features including WPA(TKIP), WPA2(AES), WPA-PSK, and WEP (64 or 128 bits) in order to meet the different access control requirements for different users and applications.

CENTRALIZED ARCHITECTURE

Wireless AC or Cloud AC can remotely and centrally control all aspects of AP operations including configuration of channel, power, SSID, security, VLAN etc.

COMPREHENSIVE MANAGEMENT

The centralized network management

Technical Specifications

WLAN CHARACTERISTICS

WLAN Standards	IEEE802.11a/b/g/n/ac
SSID number	Up to 32 BSSID
Per-SSID configuration	Yes: authentication, encryption, VLAN attributes
Hidden SSID	Yes
Max clients per AP	256
WDS	Yes (Bridge mode)
Mesh	Yes
Fair airtime	Yes
Intelligent identification of smart devices	Yes
Intelligent load balancing based on the number of users or traffic	Yes
STA control	SSID/radio-based
Bandwidth control	STA/SSID/AP-based speed control
QoS	WMM per 802.11e
5 GHz band preference	Yes
TDMA scheduling	Yes
802.11w	Yes
Dynamic Frequency	Yes

RF CHARACTERISTICS

Radio	Concurrent dual-radio dual-band
MIMO	2x2 SU-MIMO
Spatial Streams	2
Frequency Bands	802.11b/g/n: 2.4GHz to 2.483GHz 802.11a/n/ac: 5.150GHz to 5.350GHz, 5.47GHz to 5.725GHz, 5.725GHz to 5.850GHz (varies per country)
Max Data Rates	Internal antenna: 300Mbps@2.4GHz 866Mbps@5GHz 1.167Gbps per AP
Channel Bandwidth	20/40/80MHz
RF Power output	24dBm max per radio (Note: Actual max transmit power depends on local laws and regulations)
RF Power Adjustment	1dBm step
Receiver Sensitivity	2.4GHz: -101dBm (varies in different bands) 5GHz: -93dBm (varies in different bands)

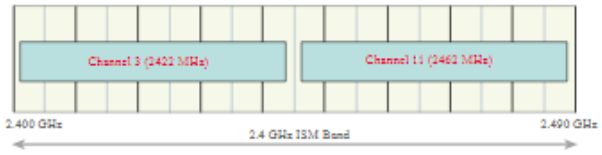
(*E.g.*, https://www.utstar.com/sites/default/files/resources/uoa5430-o_data_sheet.pdf).

The IEEE 802.11 HT STA provides physical layer (PHY) and medium access control (MAC) features that can support a throughput of 100 Mb/s and greater, as measured at the MAC data service access point (SAP). An HT STA supports HT features as identified in Clause 9 and Clause 20. An HT STA operating in the 5 GHz band supports transmission and reception of frames that are compliant with mandatory PHY specifications as defined in Clause 17. An HT STA operating in the 2.4 GHz band supports transmission and reception of frames that are compliant with mandatory PHY specifications as defined in Clause 18 and Clause 19. An HT STA is also a quality of service (QoS) STA. The HT features are available to HT STAs associated with an HT access point (AP) in a basic service set (BSS). A subset of the HT features is available for use between two HT STAs that are members of the same independent basic service set (IBSS).

An HT STA has PHY features consisting of the modulation and coding scheme (MCS) set described in 20.3.5 and physical layer convergence procedure (PLCP) protocol data unit (PPDU) formats described in 20.1.4. Some PHY features that distinguish an HT STA from a non-HT STA are referred to as multiple input, multiple output (MIMO) operation; spatial multiplexing (SM); spatial mapping (including transmit beamforming); space-time block coding (STBC); low-density parity check (LDPC) encoding; and antenna selection (ASEL). The allowed PPDU formats are non-HT format, HT-mixed format, and HT-greenfield format. The PPDUs may be transmitted with 20 MHz or 40 MHz bandwidth.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

With the use of IEEE 802.11n, there is the possibility of using signal bandwidths of either 20 MHz or 40 MHz. When 40 MHz bandwidth is used to gain the higher data throughput, this obviously reduces the number of channels that can be used.



IEEE 802.11n 2.4 GHz Wi-Fi 40 MHz channels, frequencies & channel numbers.

(*E.g.*, https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).

11.14.2 Basic 20/40 MHz BSS functionality

An HT AP declares its channel width capability (20 MHz only or 20/40 MHz) in the Supported Channel Width Set subfield of the HT Capabilities element.

An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN.

A non-AP HT STA declares its channel width capability (non-FC HT STA or FC HT STA) in the Supported Channel Width Set subfield in the HT Capabilities element.

If the AP or IDO STA starts a 20/40 MHz BSS in the 5 GHz band and the BSS occupies the same two channels as any existing 20/40 MHz BSSs, then the AP or IDO STA shall ensure that the primary channel of the new BSS is identical to the primary channel of the existing 20/40 MHz BSSs and that the secondary channel of the new 20/40 MHz BSS is identical to the secondary channel of the existing 20/40 MHz BSSs, unless the AP discovers that on these two channels are existing 20/40 MHz BSSs with different primary and secondary channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

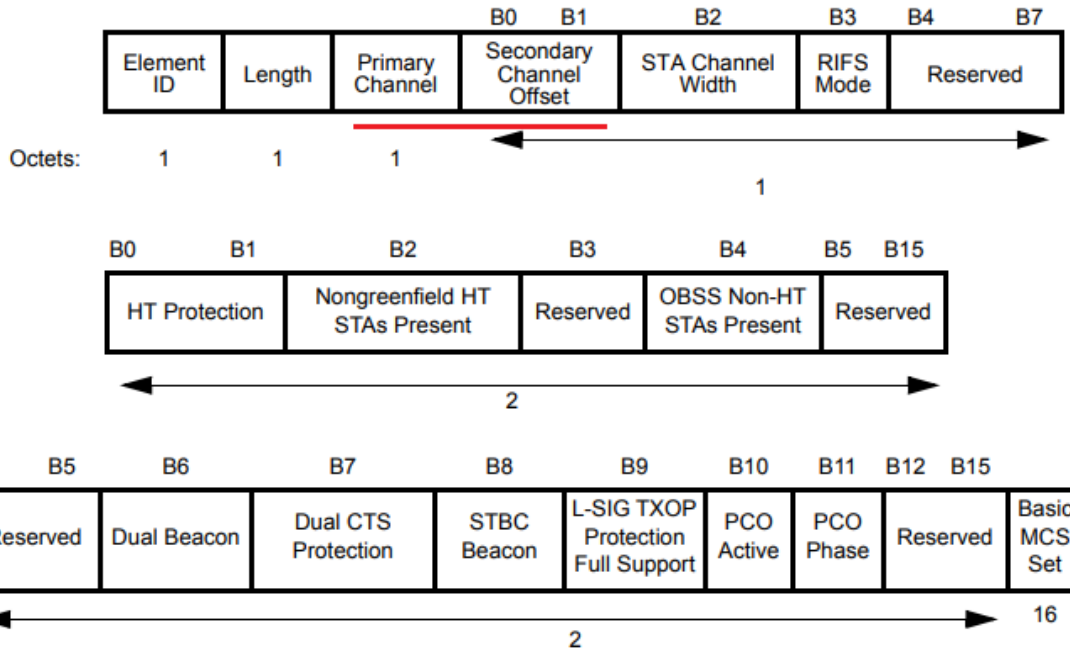
16. Upon information and belief, the Accused Instrumentality practices detecting by the apparatus (*e.g.*, associating client devices such as a smartphone, etc.) of the first transmission channel (*e.g.*, primary channel or primary channel along with secondary channel for high

throughput). The Accused Instrumentality supports IEEE 802.11n/ac standard and acts as a Wi-Fi access point. It connects with associating client devices according to the standard. It sends high throughput operation elements along with details of a primary and secondary channel pair for data transmission to the associating client devices. An associating client device detects a first communication channel (e.g., primary channel or primary channel along with secondary channel for high throughput) accordingly.

> The IEEE 802.11 HT STA provides physical layer (PHY) and medium access control (MAC) features that can support a throughput of 100 Mb/s and greater, as measured at the MAC data service access point (SAP). An HT STA supports HT features as identified in Clause 9 and Clause 20. An HT STA operating in the 5 GHz band supports transmission and reception of frames that are compliant with mandatory PHY specifications as defined in Clause 17. An HT STA operating in the 2.4 GHz band supports transmission and reception of frames that are compliant with mandatory PHY specifications as defined in Clause 18 and Clause 19. An HT STA is also a quality of service (QoS) STA. The HT features are available to HT STAs associated with an HT access point (AP) in a basic service set (BSS). A subset of the HT features is available for use between two HT STAs that are members of the same independent basic service set (IBSS).
>
> An HT STA has PHY features consisting of the modulation and coding scheme (MCS) set described in 20.3.5 and physical layer convergence procedure (PLCP) protocol data unit (PPDU) formats described in 20.1.4. Some PHY features that distinguish an HT STA from a non-HT STA are referred to as multiple input, multiple output (MIMO) operation; spatial multiplexing (SM); spatial mapping (including transmit beamforming); space-time block coding (STBC); low-density parity check (LDPC) encoding; and antenna selection (ASEL). The allowed PPDU formats are non-HT format, HT-mixed format, and HT-greenfield format. The PPDUs may be transmitted with 20 MHz or 40 MHz bandwidth.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

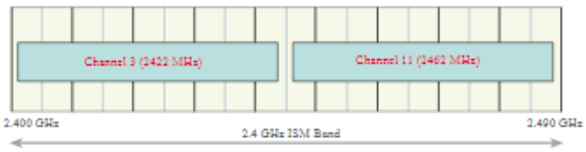
The operation of HT STAs in the BSS is controlled by the HT Operation element. The structure of this element is defined in Figure 7-95o24.



Field	Definition	Encoding	Reserved in IBSS ?
Primary Channel	Indicates the channel number of the primary channel. See 11.14.2.	Channel number of the primary channel	N
Secondary Channel Offset	Indicates the offset of the secondary channel relative to the primary channel.	Set to 1 (SCA) if the secondary channel is above the primary channel Set to 3 (SCB) if the secondary channel is below the primary channel Set to 0 (SCN) if no secondary channel is present The value 2 is reserved	N

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

With the use of IEEE 802.11n, there is the possibility of using signal bandwidths of either 20 MHz or 40 MHz. When 40 MHz bandwidth is used to gain the higher data throughput, this obviously reduces the number of channels that can be used.



IEEE 802.11n 2.4 GHz Wi-Fi 40 MHz channels, frequencies & channel numbers.

(*E.g.*, https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).

11.14.2 Basic 20/40 MHz BSS functionality

An HT AP declares its channel width capability (20 MHz only or 20/40 MHz) in the Supported Channel Width Set subfield of the HT Capabilities element.

An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN.

A non-AP HT STA declares its channel width capability (non-FC HT STA or FC HT STA) in the Supported Channel Width Set subfield in the HT Capabilities element.

If the AP or IDO STA starts a 20/40 MHz BSS in the 5 GHz band and the BSS occupies the same two channels as any existing 20/40 MHz BSSs, then the AP or IDO STA shall ensure that the primary channel of the new BSS is identical to the primary channel of the existing 20/40 MHz BSSs and that the secondary channel of the new 20/40 MHz BSS is identical to the secondary channel of the existing 20/40 MHz BSSs, unless the AP discovers that on these two channels are existing 20/40 MHz BSSs with different primary and secondary channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

17. Upon information and belief, the Accused Instrumentality practices the determining of a collision on said channel between signals originating from the first network (*e.g.*, Wi-Fi network of the Accused Instrumentality) and from a second network (*e.g.*, another Wi-Fi network

of nearby access point, radar, etc.). The Accused Instrumentality supports IEEE 802.11n/ac standard and acts as a Wi-Fi access point. It sends high throughput operation elements along with details of a primary and secondary channel pair for data transmission to the associating client devices. An associating client device detects a first communication channel (e.g., primary channel or primary channel along with secondary channel for high throughput) accordingly. While having connection with the associating client device over the first communication channel (e.g., primary channel or primary channel along with secondary channel for high throughput), the associating client device can determine a utilization of the primary or secondary channel (i.e., collision on a channel) by another Wi-Fi network, radar system, etc.

11.14.2 Basic 20/40 MHz BSS functionality

An HT AP declares its channel width capability (20 MHz only or 20/40 MHz) in the Supported Channel Width Set subfield of the HT Capabilities element.

An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN.

A non-AP HT STA declares its channel width capability (non-FC HT STA or FC HT STA) in the Supported Channel Width Set subfield in the HT Capabilities element.

If the AP or IDO STA starts a 20/40 MHz BSS in the 5 GHz band and the BSS occupies the same two channels as any existing 20/40 MHz BSSs, then the AP or IDO STA shall ensure that the primary channel of the new BSS is identical to the primary channel of the existing 20/40 MHz BSSs and that the secondary channel of the new 20/40 MHz BSS is identical to the secondary channel of the existing 20/40 MHz BSSs, unless the AP discovers that on these two channels are existing 20/40 MHz BSSs with different primary and secondary channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

While operating a 20/40 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to 20 MHz operation either alone or in combination with a channel move. These channel move or BSS width switch operations can occur if, for example, another BSS starts to operate in either or both of the primary or secondary channels, or if radar is detected in either or both of the primary or secondary channels, or for other reasons that are beyond the scope of this standard. Specifically, the AP or IDO STA may move its BSS to a different pair of channels, and the AP may separately, or in combination with the channel switch, change from a 20/40 MHz BSS to a 20 MHz BSS using either the primary channel of the previous channel pair or any other available 20 MHz channel. While operating a 20 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to a 20/40 MHz BSS, either alone or in combination with a channel move.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

Radio regulations may require RLANs operating in the 5 GHz band to implement a mechanism to avoid co-channel operation with radar systems and to ensure uniform utilization of available channels. The DFS service is used to satisfy these regulatory requirements.

The DFS service provides for the following:

- Association of STAs with an AP in a BSS based on the STAs' supported channels.
- Quieting the current channel so it can be tested for the presence of radar with less interference from other STAs.
- Testing channels for radar before using a channel and while operating in a channel.
- Discontinuing operations after detecting radar in the current channel to avoid interference with radar.
- Detecting radar in the current and other channels based on regulatory requirements.
- Requesting and reporting of measurements in the current and other channels.
- Selecting and advertising a new channel to assist the migration of a BSS or IBSS after radar is detected.

(*E.g.*, https://standards.ieee.org/standard/802_11-2007.html).

The requirements described in this subclause apply only when an HT STA is operating in a regulatory class for which the behavior limits set listed in Annex J includes the value 16; i.e., the regulatory class is subject to DFS with 50–100 µs radar pulses.

For an HT STA, the following MIB attributes shall be set to TRUE: dot11RegulatoryClassesImplemented, dot11RegulatoryClassesRequired, and dot11ExtendedChannelSwitchEnabled.

An AP operating a 20/40 MHz BSS, on detecting an OBSS whose primary channel is the AP's secondary channel, switches to 20 MHz BSS operation and may subsequently move to a different channel or pair of channels. An IBSS DFS owner (IDO) STA operating a 20/40 MHz IBSS, on detecting an OBSS whose primary channel is the IDO STA's secondary channel, may choose to move to a different pair of channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

18. Upon information and belief, the Accused Instrumentality practices, when said collision has been determined, transmitting a change of channel (*e.g.*, another communication channel) request to the first network (*e.g.*, Wi-Fi network of the Accused Instrumentality). When an associating client device detects utilization of the primary or secondary channel (i.e., collision on a channel) by another Wi-Fi network, radar system, etc., the associating client device sends channel switch request. The Accused Instrumentality receives the request to switch the impacted channel from the associating client device.

11.14.2 Basic 20/40 MHz BSS functionality

An HT AP declares its channel width capability (20 MHz only or 20/40 MHz) in the Supported Channel Width Set subfield of the HT Capabilities element.

An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN.

A non-AP HT STA declares its channel width capability (non-FC HT STA or FC HT STA) in the Supported Channel Width Set subfield in the HT Capabilities element.

If the AP or IDO STA starts a 20/40 MHz BSS in the 5 GHz band and the BSS occupies the same two channels as any existing 20/40 MHz BSSs, then the AP or IDO STA shall ensure that the primary channel of the new BSS is identical to the primary channel of the existing 20/40 MHz BSSs and that the secondary channel of the new 20/40 MHz BSS is identical to the secondary channel of the existing 20/40 MHz BSSs, unless the AP discovers that on these two channels are existing 20/40 MHz BSSs with different primary and secondary channels.

While operating a 20/40 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to 20 MHz operation either alone or in combination with a channel move. These channel move or BSS width switch operations can occur if, for example, another BSS starts to operate in either or both of the primary or secondary channels, or if radar is detected in either or both of the primary or secondary channels, or for other reasons that are beyond the scope of this standard. Specifically, the AP or IDO STA may move its BSS to a different pair of channels, and the AP may separately, or in combination with the channel switch, change from a 20/40 MHz BSS to a 20 MHz BSS using either the primary channel of the previous channel pair or any other available 20 MHz channel. While operating a 20 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to a 20/40 MHz BSS, either alone or in combination with a channel move.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

Radio regulations may require RLANs operating in the 5 GHz band to implement a mechanism to avoid co-channel operation with radar systems and to ensure uniform utilization of available channels. The DFS service is used to satisfy these regulatory requirements.

The DFS service provides for the following:

- Association of STAs with an AP in a BSS based on the STAs' supported channels.
- Quieting the current channel so it can be tested for the presence of radar with less interference from other STAs.
- Testing channels for radar before using a channel and while operating in a channel.
- Discontinuing operations after detecting radar in the current channel to avoid interference with radar.
- Detecting radar in the current and other channels based on regulatory requirements.
- Requesting and reporting of measurements in the current and other channels.
- Selecting and advertising a new channel to assist the migration of a BSS or IBSS after radar is detected.

(*E.g.*, https://standards.ieee.org/standard/802_11-2007.html).

The requirements described in this subclause apply only when an HT STA is operating in a regulatory class for which the behavior limits set listed in Annex J includes the value 16; i.e., the regulatory class is subject to DFS with 50–100 µs radar pulses.

For an HT STA, the following MIB attributes shall be set to TRUE: dot11RegulatoryClassesImplemented, dot11RegulatoryClassesRequired, and dot11ExtendedChannelSwitchEnabled.

An AP operating a 20/40 MHz BSS, on detecting an OBSS whose primary channel is the AP's secondary channel, switches to 20 MHz BSS operation and may subsequently move to a different channel or pair of channels. An IBSS DFS owner (IDO) STA operating a 20/40 MHz IBSS, on detecting an OBSS whose primary channel is the IDO STA's secondary channel, may choose to move to a different pair of channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

10.3.15.1 MLME-CHANNELSWITCH.request

10.3.15.1.2 Semantics of the service primitive

Change the parameter list in 10.3.15.1.2 follows:

The primitive parameters are as follows:

MLME-CHANNELSWITCH.request(
Mode,
Channel Number,
Secondary Channel Offset,
Channel Switch Count,
VendorSpecificInfo
)

Insert the following row before the Channel Switch Count row in the untitled table defining the primitive parameters in 10.3.15.1.2:

Name	Type	Valid range	Description
Secondary Channel Offset	Integer	As in Table 7-27a	Specifies the position of secondary channel in relation to the primary channel. The parameter shall be present if the MIB attribute dot11FortyMHzOperationImplemented is TRUE; otherwise, the parameter shall not be present.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

19. Upon information and belief, the Accused Instrumentality practices associating the apparatus (*e.g.*, associating client devices such as a smartphone, etc.) with a base station (*e.g.*, the Accused Instrumentality) of the first network (*e.g.*, Wi-Fi network of the Accused Instrumentality), following non-detection of collision. The Accused Instrumentality supports IEEE 802.11n/ac standard and acts as a Wi-Fi access point. Upon receiving a switch channel request from an associating client device, the Accused Instrumentality switches the communication channel from the impacted channel pair to a new channel pair of primary and secondary device. In case of detection of non-utilization of the new primary or secondary channel (i.e., collision on a channel) by another Wi-Fi network, radar system, etc., the associating client device connects with the Accused Instrumentality over the communication channel.

11.14.2 Basic 20/40 MHz BSS functionality

An HT AP declares its channel width capability (20 MHz only or 20/40 MHz) in the Supported Channel Width Set subfield of the HT Capabilities element.

An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN.

A non-AP HT STA declares its channel width capability (non-FC HT STA or FC HT STA) in the Supported Channel Width Set subfield in the HT Capabilities element.

If the AP or IDO STA starts a 20/40 MHz BSS in the 5 GHz band and the BSS occupies the same two channels as any existing 20/40 MHz BSSs, then the AP or IDO STA shall ensure that the primary channel of the new BSS is identical to the primary channel of the existing 20/40 MHz BSSs and that the secondary channel of the new 20/40 MHz BSS is identical to the secondary channel of the existing 20/40 MHz BSSs, unless the AP discovers that on these two channels are existing 20/40 MHz BSSs with different primary and secondary channels.

While operating a 20/40 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to 20 MHz operation either alone or in combination with a channel move. These channel move or BSS width switch operations can occur if, for example, another BSS starts to operate in either or both of the primary or secondary channels, or if radar is detected in either or both of the primary or secondary channels, or for other reasons that are beyond the scope of this standard. Specifically, the AP or IDO STA may move its BSS to a different pair of channels, and the AP may separately, or in combination with the channel switch, change from a 20/40 MHz BSS to a 20 MHz BSS using either the primary channel of the previous channel pair or any other available 20 MHz channel. While operating a 20 MHz BSS, an IDO STA or an AP may decide to move its BSS, and an AP may decide to switch the BSS to a 20/40 MHz BSS, either alone or in combination with a channel move.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

Radio regulations may require RLANs operating in the 5 GHz band to implement a mechanism to avoid co-channel operation with radar systems and to ensure uniform utilization of available channels. The DFS service is used to satisfy these regulatory requirements.

The DFS service provides for the following:

- Association of STAs with an AP in a BSS based on the STAs' supported channels.
- Quieting the current channel so it can be tested for the presence of radar with less interference from other STAs.
- Testing channels for radar before using a channel and while operating in a channel.
- Discontinuing operations after detecting radar in the current channel to avoid interference with radar.
- Detecting radar in the current and other channels based on regulatory requirements.
- Requesting and reporting of measurements in the current and other channels.
- Selecting and advertising a new channel to assist the migration of a BSS or IBSS after radar is detected.

(*E.g.*, https://standards.ieee.org/standard/802_11-2007.html).

The requirements described in this subclause apply only when an HT STA is operating in a regulatory class for which the behavior limits set listed in Annex J includes the value 16; i.e., the regulatory class is subject to DFS with 50–100 µs radar pulses.

For an HT STA, the following MIB attributes shall be set to TRUE: dot11RegulatoryClassesImplemented, dot11RegulatoryClassesRequired, and dot11ExtendedChannelSwitchEnabled.

An AP operating a 20/40 MHz BSS, on detecting an OBSS whose primary channel is the AP's secondary channel, switches to 20 MHz BSS operation and may subsequently move to a different channel or pair of channels. An IBSS DFS owner (IDO) STA operating a 20/40 MHz IBSS, on detecting an OBSS whose primary channel is the IDO STA's secondary channel, may choose to move to a different pair of channels.

(*E.g.*, https://standards.ieee.org/standard/802_11n-2009.html).

IV. COUNT II
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 7,523,479)

20. Plaintiff incorporates the above paragraphs herein by reference.

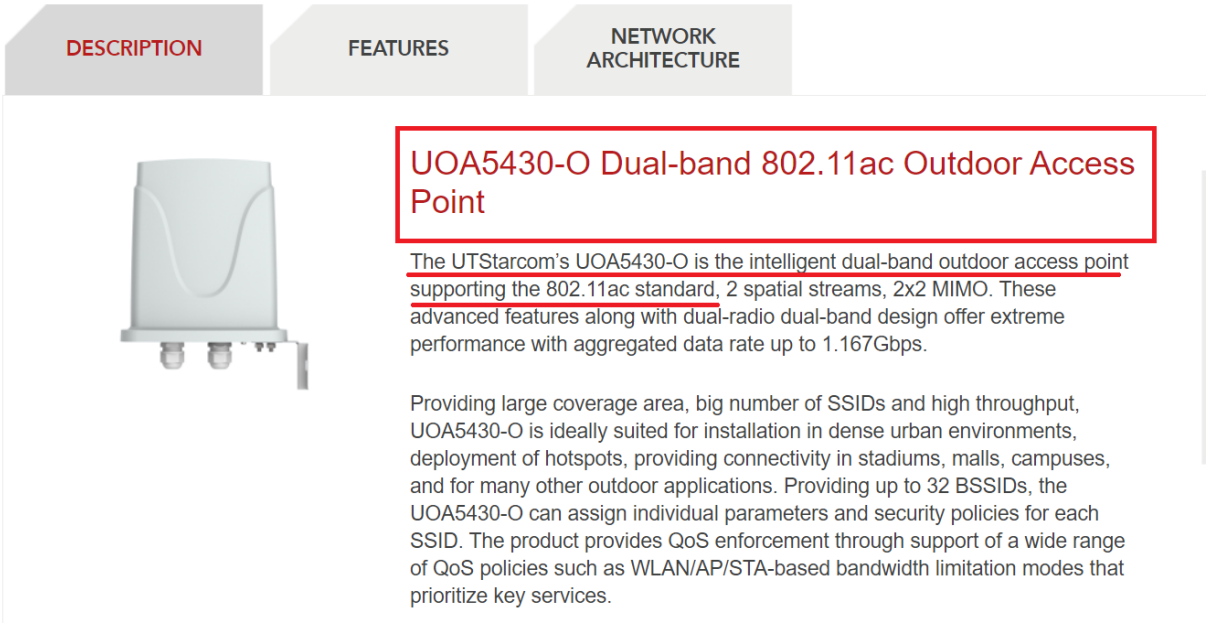
21. On April 21, 2009, United States Patent No. 7,523,479 ("the '479 Patent") was duly and legally issued by the United States Patent and Trademark Office. The '479 Patent is titled "Dynamically Changing Communication Modes." The term of the '479 patent has been adjusted by 1,332 days. A true and correct copy of the '479 Patent is attached hereto as Exhibit B and incorporated herein by reference.

22. Triumph is the assignee of all right, title and interest in the '479 patent, including all rights to enforce and prosecute actions for infringement and to collect damages for all relevant times against infringers of the '479 Patent. Accordingly, Triumph possesses the exclusive right and standing to prosecute the present action for infringement of the '479 Patent by Defendant.

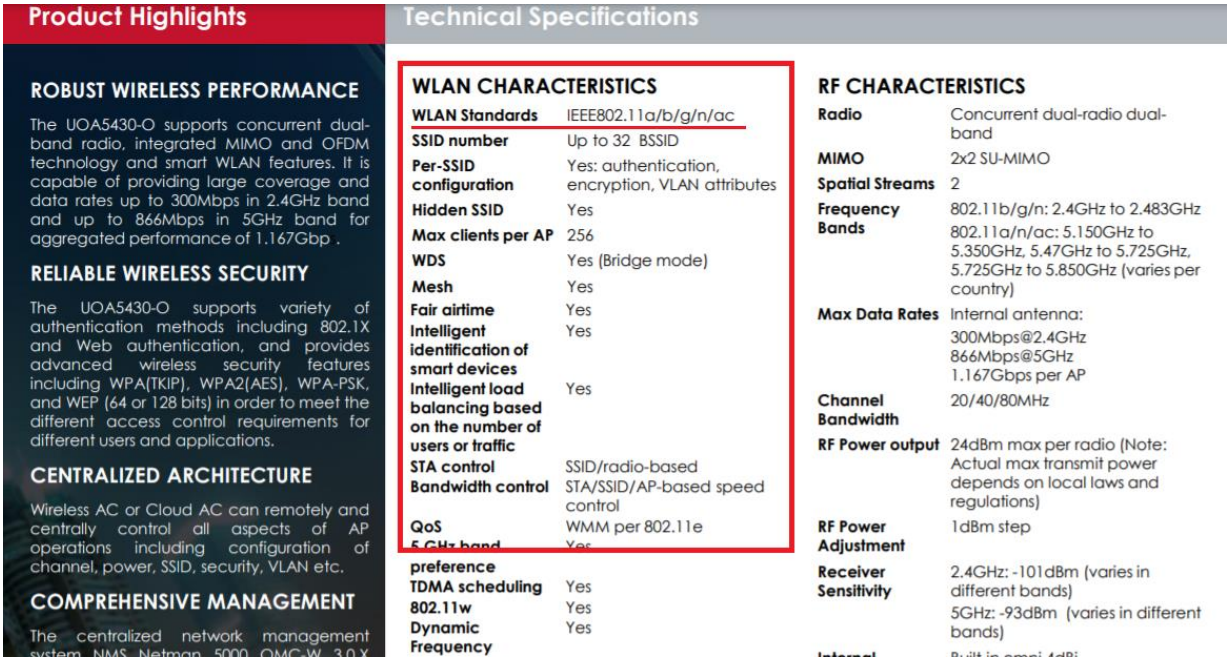
23. The invention in the '479 Patent relates to the field of communications systems, more particularly to communication modes in communication systems. (Ex. B at col. 1:6-8).

24. **Direct Infringement.** Upon information and belief, Defendant has been directly infringing at least claim 1 of the '479 Patent in Delaware, and elsewhere in the United States, by performing actions comprising at least performing the claimed method for implementing a first and a second communication mode for a communication terminal by performing the steps of the claimed invention using the UTStarcom UOA5430-O Dual-band 802.11ac Outdoor Access Point ("Accused Instrumentality") (*e.g.*, https://www.utstar.com/?q=uoa5430-o).

25. The Accused practices a method for implementing a first (*e.g.*, operating in a first channel width) and a second communication mode (*e.g.*, operating in another channel width) for a communication terminal (*e.g.*, the Accused Instrumentality). The Accused Instrumentality supports IEEE 802.11ac standard. It also supports operating mode changing functionality, in which it sends/receives a notification to change a current operating mode (*e.g.*, operating in a first channel width) to another operating mode (*e.g.*, operating in another channel width). (*E.g.*, http://www.utstar.com/; https://www.utstar.com/?q=uoa5430-o; https://www.utstar.com/sites/default/files/resources/uoa5430-o_data_sheet.pdf; https://standards.ieee.org/standard/802_11n-2009.html; https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).



(*E.g.*, https://www.utstar.com/?q=uoa5430-o).



(*E.g.*, https://www.utstar.com/sites/default/files/resources/uoa5430-o_data_sheet.pdf).

4.3.10a Very high throughput (VHT) STA

This subclause summarizes the normative requirements for an IEEE 802.11 VHT STA stated elsewhere in this standard.

The IEEE 802.11 VHT STA operates in frequency bands below 6 GHz excluding the 2.4 GHz band.

A VHT STA is an HT STA that, in addition to features supported as an HT STA, supports VHT features identified in Clause 8, Clause 9, Clause 10, Clause 13, Clause 18, and Clause 22.

The main PHY features in a VHT STA that are not present in an HT STA are the following:

- Mandatory support for 40 MHz and 80 MHz channel widths
- Mandatory support for VHT single-user (SU) PPDUs
- Optional support for 160 MHz and 80+80 MHz channel widths
- Optional support for VHT sounding protocol to support beamforming
- Optional support for VHT multi-user (MU) PPDUs
- Optional support for VHT-MCSs 8 and 9

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

8.4.2.29 Extended Capabilities element

Insert the following rows in Table 8-103, and change the reserved bits accordingly:

Table 8-103—Capabilities field

Bit	Information	Description
61	TDLS Wider Bandwidth	The TDLS Wider Bandwidth subfield indicates whether the STA supports a wider bandwidth than the BSS bandwidth for a TDLS direct link on the base channel. The field is set to 1 to indicate that the STA supports a wider bandwidth on the base channel and to 0 to indicate that the STA does not support a wider bandwidth on the base channel. A 160 MHz bandwidth is defined to be identical to an 80+80 MHz bandwidth (i.e., one is not wider than the other).

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Table 8-103—Capabilities field *(continued)*

Bit	Information	Description
62	Operating Mode Notification	If dot11OperatingModeNotificationImplemented is true, the Operating Mode Notification field is set to 1 to indicate support for reception of the Operating Mode Notification element and the Operating Mode Notification frame. If dot11OperatingModeNotificationImplemented is false or not present, the Operating Mode Notification field is set to 0 to indicate lack of support for reception of the Operating Mode Notification element and the Operating Mode Notification frame.
63–64	Max Number Of MSDUs In A-MSDU	Indicates the maximum number of MSDUs in an A-MSDU that the STA is able to receive: Set to 0 to indicate that no limit applies. Set to 1 for 32. Set to 2 for 16. Set to 3 for 8 Reserved, if A-MSDU is not supported.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Subfield	Description
Channel Width	If the Rx NSS Type subfield is 0, indicates the supported channel width: Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160 MHz or 80+80 MHz Reserved if the Rx NSS Type subfield is 1.
Rx NSS	If the Rx NSS Type subfield is 0, indicates the maximum number of spatial streams that the STA can receive. If the Rx NSS Type subfield is 1, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. Set to 0 for $N_{SS} = 1$ Set to 1 for $N_{SS} = 2$ … Set to 7 for $N_{SS} = 8$
Rx NSS Type	Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive. Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. NOTE—An AP always sets this field to 0.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

26. Upon information and belief, the Accused Instrumentality practices implementing the first communication mode (*e.g.*, operating in a first channel width) based on a first data communication mode identifier (*e.g.*, a channel width identifier indicated in operating mode field), the implementing including receiving at the communication terminal (*e.g.*, the Accused Instrumentality) a first type of data (*e.g.*, data communication between the Accused Instrumentality and associated devices over Wi-Fi network) in accordance with a first communication standard (*e.g.*, 802.11ac standard). The Accused Instrumentality implements a first channel width to communicate with its accessory devices over 802.11ac network.

4.3.10a Very high throughput (VHT) STA

This subclause summarizes the normative requirements for an IEEE 802.11 VHT STA stated elsewhere in this standard.

The IEEE 802.11 VHT STA operates in frequency bands below 6 GHz excluding the 2.4 GHz band.

A VHT STA is an HT STA that, in addition to features supported as an HT STA, supports VHT features identified in Clause 8, Clause 9, Clause 10, Clause 13, Clause 18, and Clause 22.

The main PHY features in a VHT STA that are not present in an HT STA are the following:

- Mandatory support for 40 MHz and 80 MHz channel widths
- Mandatory support for VHT single-user (SU) PPDUs
- Optional support for 160 MHz and 80+80 MHz channel widths
- Optional support for VHT sounding protocol to support beamforming
- Optional support for VHT multi-user (MU) PPDUs
- Optional support for VHT-MCSs 8 and 9

8.4.2.161 VHT Operation element

The operation of VHT STAs in the BSS is controlled by the HT Operation element and the VHT Operation element. The format of the VHT Operation element is defined in Figure 8-401bt.

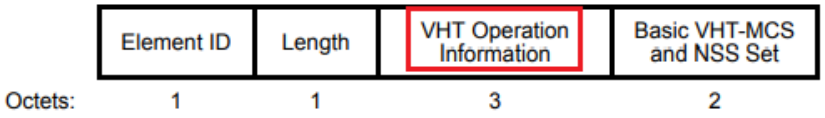


Figure 8-401bt—VHT Operation element format

The Element ID field is set to the value for VHT Operation element defined in Table 8-54.

The structure of the VHT Operation Information field is defined in Figure 8-401bu.

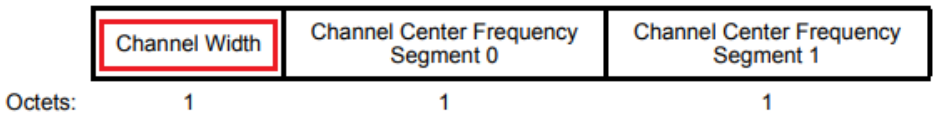


Figure 8-401bu—VHT Operation Information field

The VHT STA gets the primary channel information from the HT Operation element. The subfields of the VHT Operation Information field are defined in Table 8-183x.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Table 8-183x—VHT Operation Information subfields

Field	Definition	Encoding
Channel Width	This field, together with the HT Operation element STA Channel Width field, defines the BSS operating channel width (see 10.39.1).	Set to 0 for 20 MHz or 40 MHz operating channel width. Set to 1 for 80 MHz operating channel width. Set to 2 for 160 MHz operating channel width. Set to 3 for 80+80 MHz operating channel width. Values in the range 4 to 255 are reserved.
Channel Center Frequency Segment 0	Defines the channel center frequency for an 80 and 160 MHz VHT BSS and the frequency segment 0 channel center frequency for an 80+80 MHz VHT BSS. See 22.3.14.	For 80 MHz or 160 MHz operating channel width, indicates the channel center frequency index for the 80 MHz or 160 MHz channel on which the VHT BSS operates. For 80+80 MHz operating channel width, indicates the channel center frequency index for the 80 MHz channel of frequency segment 0 on which the VHT BSS operates. Reserved otherwise.
Channel Center Frequency Segment 1	Defines the frequency segment 1 channel center frequency for an 80+80 MHz VHT BSS. See 22.3.14.	For an 80+80 MHz operating channel width, indicates the channel center frequency index of the 80 MHz channel of frequency segment 1 on which the VHT BSS operates. Reserved otherwise.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

8.4.2.29 Extended Capabilities element

Insert the following rows in Table 8-103, and change the reserved bits accordingly:

Table 8-103—Capabilities field

Bit	Information	Description
61	TDLS Wider Bandwidth	The TDLS Wider Bandwidth subfield indicates whether the STA supports a wider bandwidth than the BSS bandwidth for a TDLS direct link on the base channel. The field is set to 1 to indicate that the STA supports a wider bandwidth on the base channel and to 0 to indicate that the STA does not support a wider bandwidth on the base channel. A 160 MHz bandwidth is defined to be identical to an 80+80 MHz bandwidth (i.e., one is not wider than the other).

Table 8-103—Capabilities field *(continued)*

Bit	Information	Description
62	Operating Mode Notification	If dot11OperatingModeNotificationImplemented is true, the Operating Mode Notification field is set to 1 to indicate support for reception of the Operating Mode Notification element and the Operating Mode Notification frame. If dot11OperatingModeNotificationImplemented is false or not present, the Operating Mode Notification field is set to 0 to indicate lack of support for reception of the Operating Mode Notification element and the Operating Mode Notification frame.
63–64	Max Number Of MSDUs In A-MSDU	Indicates the maximum number of MSDUs in an A-MSDU that the STA is able to receive: Set to 0 to indicate that no limit applies. Set to 1 for 32. Set to 2 for 16. Set to 3 for 8 Reserved, if A-MSDU is not supported.

8.4.1.50 Operating Mode field

The Operating Mode field is present in the Operating Mode Notification frame (see 8.5.23.4) and Operating Mode Notification element (see 8.4.2.168).

The Operating Mode field is shown in Figure 8-80e.

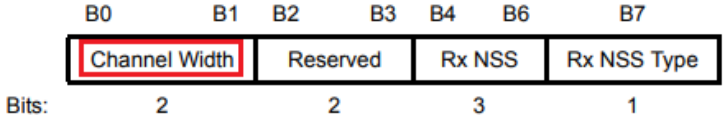


Figure 8-80e—Operating Mode field

The STA transmitting this field indicates its current operating channel width and the number of spatial streams it can receive using the settings defined in Table 8-53k.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Subfield	Description
Channel Width	If the Rx NSS Type subfield is 0, indicates the supported channel width: Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160 MHz or 80+80 MHz Reserved if the Rx NSS Type subfield is 1.
Rx NSS	If the Rx NSS Type subfield is 0, indicates the maximum number of spatial streams that the STA can receive. If the Rx NSS Type subfield is 1, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. Set to 0 for $N_{SS} = 1$ Set to 1 for $N_{SS} = 2$ … Set to 7 for $N_{SS} = 8$
Rx NSS Type	Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive. Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. NOTE—An AP always sets this field to 0.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

27. Upon information and belief, the Accused Instrumentality practices receiving from an agent external (*e.g.*, an accessory device which is operating mode notification capable associated over Wi-Fi network) to the communication terminal (*e.g.*, the Accused Instrumentality) a first message authorizing (*e.g.*, a first message indicating operating mode capability) a change from the first communication mode (*e.g.*, a channel width) to the second communication mode (*e.g.*, another channel width). At least in internal testing and usages, an accessory device supporting IEEE 802.11ac standard, communicates its extended capability of operating mode notification capable during association/reassociation to the Accused Instrumentality. The

accessory device authorizes the Accused Instrumentality to implement operating mode changing functionality by providing extended capability to the Accused Instrumentality.

8.5.23 VHT Action frame details

8.5.23.1 VHT Action field

Several Action frame formats are defined to support VHT functionality. A VHT Action field, in the octet immediately after the Category field, differentiates the VHT Action frame formats. The VHT Action field values associated with each frame format within the VHT category are defined in Table 8-281ah.

Table 8-281ah—VHT Action field values

Value	Meaning	Time Priority
0	VHT Compressed Beamforming	Yes
1	Group ID Management	No
2	Operating Mode Notification	No
3–255	Reserved	

8.4.2.29 Extended Capabilities element

Insert the following rows in Table 8-103, and change the reserved bits accordingly:

Table 8-103—Capabilities field

Bit	Information	Description
61	TDLS Wider Bandwidth	The TDLS Wider Bandwidth subfield indicates whether the STA supports a wider bandwidth than the BSS bandwidth for a TDLS direct link on the base channel. The field is set to 1 to indicate that the STA supports a wider bandwidth on the base channel and to 0 to indicate that the STA does not support a wider bandwidth on the base channel. A 160 MHz bandwidth is defined to be identical to an 80+80 MHz bandwidth (i.e., one is not wider than the other).

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Table 8-103—Capabilities field *(continued)*

Bit	Information	Description
62	Operating Mode Notification	If dot11OperatingModeNotificationImplemented is true, the Operating Mode Notification field is set to 1 to indicate support for reception of the Operating Mode Notification element and the Operating Mode Notification frame. If dot11OperatingModeNotificationImplemented is false or not present, the Operating Mode Notification field is set to 0 to indicate lack of support for reception of the Operating Mode Notification element and the Operating Mode Notification frame.
63–64	Max Number Of MSDUs In A-MSDU	Indicates the maximum number of MSDUs in an A-MSDU that the STA is able to receive: Set to 0 to indicate that no limit applies. Set to 1 for 32. Set to 2 for 16. Set to 3 for 8 Reserved, if A-MSDU is not supported.

10.41 Notification of operating mode changes

A STA whose dot11OperatingModeNotificationImplemented is true shall set the Operating Mode Notification field in the Extended Capabilities element to 1. A VHT STA shall set dot11OperatingModeNotificationImplemented to true. A STA that has the value true for dot11OperatingModeNotificationImplemented is referred to as *operating mode notification capable*.

A STA that is operating mode notification capable and that transmits an Association Request, Reassociation Request, TDLS Setup Response, TDLS Setup Confirm, Mesh Peering Open, or Mesh Peering Confirm frame to a STA that is operating mode notification capable should notify the recipient STA of a change in its operating mode by including the Operating Mode Notification element in the frame.

A first STA that is operating mode notification capable should notify a second STA that is operating mode notification cable of a change in its operating mode by transmitting an Operating Mode Notification frame to the second STA if the first STA has established any of the following with a second STA:

— An association with an AP
— A TDLS link
— A DLS link
— A Mesh Peer relationship

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

28. Upon information and belief, the Accused Instrumentality practices receiving from the agent external (*e.g.*, an accessory device which is operating mode notification capable associated over Wi-Fi network) to the communication terminal (*e.g.*, the Accused Instrumentality) a second message (*e.g.*, operating mode changing notification) comprising a second data

communication mode identifier (e.g., another channel width identifier indicated in operating mode field) specifying a communication mode (*e.g.*, another channel width). At least in internal testing and usages, an accessory device supporting IEEE 802.11ac standard, notifies the Accused Instrumentality of changing operating mode through transmitting operating mode changing notification.

Table 8-20—Beacon frame body

Order	Information	Notes
60	VHT Capabilities	The VHT Capabilities element is present when the dot11VHTOptionImplemented is true.
61	VHT Operation	The VHT Operation element is present when the dot11VHTOptionImplemented is true; otherwise, it is not present.
62	VHT Transmit Power Envelope element	One VHT Transmit Power Envelope element is present for each distinct value of the Local Maximum Transmit Power Unit Interpretation subfield that is supported for the BSS if both of the following conditions are met: — dot11VHTOptionImplemented is true; — Either dot11SpectrumManagementRequired is true or dot11RadioMeasurementActivated is true. Otherwise, this parameter is not present.
63	Channel Switch Wrapper element	The Channel Switch Wrapper element is optionally present if dot11VHTOptionImplemented is true and at least one of a Channel Switch Announcement element or an Extended Channel Switch Announcement element is also present in the Beacon frame and the Channel Switch Wrapper element contains at least one subelement.
64	Extended BSS Load element	The Extended BSS Load element is optionally present if dot11QosOptionImplemented, dot11QBSSLoadImplemented and dot11VHTOptionImplemented are true.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

8.4.2.168 Operating Mode Notification element

The Operating Mode Notification element is used to notify STAs that the transmitting STA is changing its operating channel width, the maximum number of spatial streams it can receive, or both. The format of the Operating Mode Notification element is defined in Figure 8-401cc.

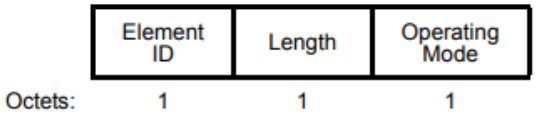


Figure 8-401cc—Operating Mode Notification element

The Element ID field is set to the value for the Operating Mode Notification element in Table 8-54.

The Length field is set to 1.

The Operating Mode field is defined in 8.4.1.50.

8.5.23.4 Operating Mode Notification frame format

The Operating Mode Notification frame is an Action frame of category VHT. It is used to notify STAs that the transmitting STA is changing its operating channel width, the maximum number of spatial streams it can receive, or both.

The Action field of the Operating Mode Notification frame contains the information shown in Table 8-281ak.

Table 8-281ak—Operating Mode Notification frame Action field format

Order	Information
1	Category
2	VHT Action
3	Operating Mode (see 8.4.1.50)

The Category field is set to the value for VHT, specified in Table 8-38.

The VHT Action field is set to the value for Operating Mode Notification, specified in Table 8-281ah.

8.4.1.50 Operating Mode field

The Operating Mode field is present in the Operating Mode Notification frame (see 8.5.23.4) and Operating Mode Notification element (see 8.4.2.168).

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

The Operating Mode field is shown in Figure 8-80e.

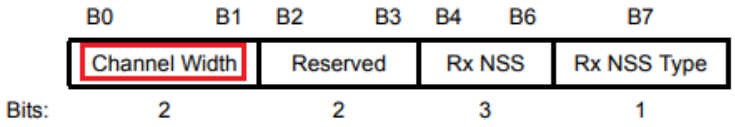


Figure 8-80e—Operating Mode field

The STA transmitting this field indicates its current operating channel width and the number of spatial streams it can receive using the settings defined in Table 8-53k.

Subfield	Description
Channel Width	If the Rx NSS Type subfield is 0, indicates the supported channel width: Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160 MHz or 80+80 MHz Reserved if the Rx NSS Type subfield is 1.
Rx NSS	If the Rx NSS Type subfield is 0, indicates the maximum number of spatial streams that the STA can receive. If the Rx NSS Type subfield is 1, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. Set to 0 for $N_{SS} = 1$ Set to 1 for $N_{SS} = 2$ … Set to 7 for $N_{SS} = 8$
Rx NSS Type	Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive. Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. NOTE—An AP always sets this field to 0.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

10.41 Notification of operating mode changes

A STA whose dot11OperatingModeNotificationImplemented is true shall set the Operating Mode Notification field in the Extended Capabilities element to 1. A VHT STA shall set dot11OperatingModeNotificationImplemented to true. A STA that has the value true for dot11OperatingModeNotificationImplemented is referred to as *operating mode notification capable*.

A STA that is operating mode notification capable and that transmits an Association Request, Reassociation Request, TDLS Setup Response, TDLS Setup Confirm, Mesh Peering Open, or Mesh Peering Confirm frame to a STA that is operating mode notification capable should notify the recipient STA of a change in its operating mode by including the Operating Mode Notification element in the frame.

A first STA that is operating mode notification capable should notify a second STA that is operating mode notification cable of a change in its operating mode by transmitting an Operating Mode Notification frame to the second STA if the first STA has established any of the following with a second STA:

- An association with an AP
- A TDLS link
- A DLS link
- A Mesh Peer relationship

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

29. Upon information and belief, the Accused Instrumentality practices, responsive to receiving the first message (*e.g.*, a first message indicating operating mode capability) and the second message (*e.g.*, operating mode changing notification), implementing the second communication mode (*e.g.*, another channel width) if the second communication mode identifier (*e.g.*, another channel width identifier indicated in operating mode field) is different than the first communication mode identifier (*e.g.*, a channel width identifier indicated in operating mode field), the second communication mode (*e.g.*, another channel width) different than the first communication mode (*e.g.*, a channel width), otherwise maintaining implementation of the first communication mode (*e.g.*, a channel width) if the second communication mode identifier (*e.g.*, another channel width identifier indicated in operating mode field) is the same as the first communication mode identifier (*e.g.*, a channel width identifier indicated in operating mode field). When the Accused Instrumentality receives operating mode change notification comprising the second operating mode identifier, the Accused Instrumentality switches to the second operating

mode (*e.g.*, changing operating from a first channel width to another channel width). However, when the operating mode change notification is related to spatial streams, the notification does not comprise an identifier for the second operating mode; the Accused Instrumentality keeps operating at the first channel width (*e.g.*, a first operating mode) only.

8.4.1.50 Operating Mode field

The Operating Mode field is present in the Operating Mode Notification frame (see 8.5.23.4) and Operating Mode Notification element (see 8.4.2.168).

The Operating Mode field is shown in Figure 8-80e.

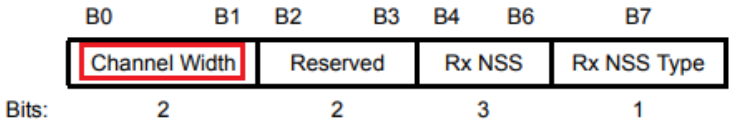


Figure 8-80e—Operating Mode field

The STA transmitting this field indicates its current operating channel width and the number of spatial streams it can receive using the settings defined in Table 8-53k.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Subfield	Description
Channel Width	If the Rx NSS Type subfield is 0, indicates the supported channel width: Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160 MHz or 80+80 MHz Reserved if the Rx NSS Type subfield is 1.
Rx NSS	If the Rx NSS Type subfield is 0, indicates the maximum number of spatial streams that the STA can receive. If the Rx NSS Type subfield is 1, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. Set to 0 for $N_{SS} = 1$ Set to 1 for $N_{SS} = 2$ … Set to 7 for $N_{SS} = 8$
Rx NSS Type	Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive. Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. NOTE—An AP always sets this field to 0.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Table 8-20—Beacon frame body

Order	Information	Notes
60	VHT Capabilities	The VHT Capabilities element is present when the dot11VHTOptionImplemented is true.
61	VHT Operation	The VHT Operation element is present when the dot11VHTOptionImplemented is true; otherwise, it is not present.
62	VHT Transmit Power Envelope element	One VHT Transmit Power Envelope element is present for each distinct value of the Local Maximum Transmit Power Unit Interpretation subfield that is supported for the BSS if both of the following conditions are met: — dot11VHTOptionImplemented is true; — Either dot11SpectrumManagementRequired is true or dot11RadioMeasurementActivated is true. Otherwise, this parameter is not present.
63	Channel Switch Wrapper element	The Channel Switch Wrapper element is optionally present if dot11VHTOptionImplemented is true and at least one of a Channel Switch Announcement element or an Extended Channel Switch Announcement element is also present in the Beacon frame and the Channel Switch Wrapper element contains at least one subelement.
64	Extended BSS Load element	The Extended BSS Load element is optionally present if dot11QosOptionImplemented, dot11QBSSLoadImplemented and dot11VHTOptionImplemented are true.

8.4.2.168 Operating Mode Notification element

The Operating Mode Notification element is used to notify STAs that the transmitting STA is changing its operating channel width, the maximum number of spatial streams it can receive, or both. The format of the Operating Mode Notification element is defined in Figure 8-401cc.

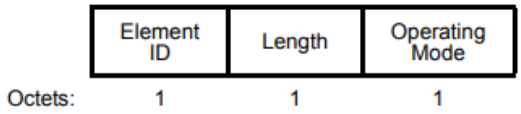


Figure 8-401cc—Operating Mode Notification element

The Element ID field is set to the value for the Operating Mode Notification element in Table 8-54.

The Length field is set to 1.

The Operating Mode field is defined in 8.4.1.50.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

8.5.23.4 Operating Mode Notification frame format

The Operating Mode Notification frame is an Action frame of category VHT. It is used to notify STAs that the transmitting STA is changing its operating channel width, the maximum number of spatial streams it can receive, or both.

The Action field of the Operating Mode Notification frame contains the information shown in Table 8-281ak.

Table 8-281ak—Operating Mode Notification frame Action field format

Order	Information
1	Category
2	VHT Action
3	Operating Mode (see 8.4.1.50)

The Category field is set to the value for VHT, specified in Table 8-38.

The VHT Action field is set to the value for Operating Mode Notification, specified in Table 8-281ah.

8.4.1.50 Operating Mode field

The Operating Mode field is present in the Operating Mode Notification frame (see 8.5.23.4) and Operating Mode Notification element (see 8.4.2.168).

The Operating Mode field is shown in Figure 8-80e.

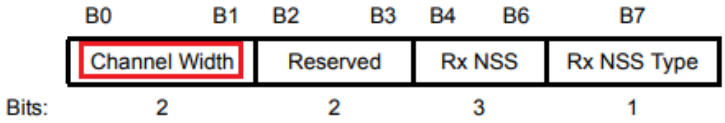


Figure 8-80e—Operating Mode field

The STA transmitting this field indicates its current operating channel width and the number of spatial streams it can receive using the settings defined in Table 8-53k.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

Subfield	Description
Channel Width	If the Rx NSS Type subfield is 0, indicates the supported channel width: Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160 MHz or 80+80 MHz Reserved if the Rx NSS Type subfield is 1.
Rx NSS	If the Rx NSS Type subfield is 0, indicates the maximum number of spatial streams that the STA can receive. If the Rx NSS Type subfield is 1, indicates the maximum number of spatial streams that the STA can receive as a beamformee in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. Set to 0 for $N_{SS} = 1$ Set to 1 for $N_{SS} = 2$ … Set to 7 for $N_{SS} = 8$
Rx NSS Type	Set to 0 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive. Set to 1 to indicate that the Rx NSS subfield carries the maximum number of spatial streams that the STA can receive in an SU PPDU using a beamforming steering matrix derived from a VHT Compressed Beamforming report with the Feedback Type subfield indicating MU in the corresponding VHT Compressed Beamforming frame sent by the STA. NOTE—An AP always sets this field to 0.

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

10.41 Notification of operating mode changes

A STA whose dot11OperatingModeNotificationImplemented is true shall set the Operating Mode Notification field in the Extended Capabilities element to 1. A VHT STA shall set dot11OperatingModeNotificationImplemented to true. A STA that has the value true for dot11OperatingModeNotificationImplemented is referred to as *operating mode notification capable*.

A STA that is operating mode notification capable and that transmits an Association Request, Reassociation Request, TDLS Setup Response, TDLS Setup Confirm, Mesh Peering Open, or Mesh Peering Confirm frame to a STA that is operating mode notification capable should notify the recipient STA of a change in its operating mode by including the Operating Mode Notification element in the frame.

A first STA that is operating mode notification capable should notify a second STA that is operating mode notification cable of a change in its operating mode by transmitting an Operating Mode Notification frame to the second STA if the first STA has established any of the following with a second STA:

- An association with an AP
- A TDLS link
- A DLS link
- A Mesh Peer relationship

(*E.g.*, https://standards.ieee.org/standard/802_11ac-2013.html).

30. Plaintiff has been damaged as a result of Defendant's infringing conduct. Defendant is thus liable to Plaintiff for damages in an amount that adequately compensates Plaintiff for such Defendant's infringement of the '291 Patent and '479 Patent, *i.e.*, in an amount that by law cannot be less than would constitute a reasonable royalty for the use of the patented technology, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

31. On information and belief, Defendant has had at least constructive notice of the '291 Patent, and '479 Patent, by operation of law and marking requirements have been complied with.

V. JURY DEMAND

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

VI. PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Plaintiff the following relief:

a. Judgment that one or more claims of United States Patent No. 7,177,291 have been infringed, either literally and/or under the doctrine of equivalents, by Defendant;

b. Judgment that one or more claims of United States Patent No. 7,523,479 have been infringed, either literally and/or under the doctrine of equivalents, by Defendant;

c. Judgment that Defendant account for and pay to Plaintiff all damages to and costs incurred by Plaintiff because of Defendant's infringing activities and other conduct complained of herein;

d. That Plaintiff be granted pre-judgment and post-judgment interest on the damages caused by Defendant's infringing activities and other conduct complained of herein;

e. That Plaintiff be granted such other and further relief as the Court may deem just and proper under the circumstances.

August 25, 2021

CHONG LAW FIRM P.A.

/s/ Jimmy Chong
Jimmy Chong (#4839)
2961 Centerville Road, Suite 350
Wilmington, DE 19808
Telephone: (302) 999-9480
Facsimile: (302) 800-1999
Email: chong@chonglawfirm.com

Attorneys for Plaintiff Triumph IP LLC

OF COUNSEL:

David R. Bennett
Direction IP Law
P.O. Box 14184
Chicago, IL 60614-0184
(312) 291-1667
dbennett@directionip.com